

## BRIEF NOTES ON THE HELICOSPOREAE WITH DESCRIPTIONS OF FOUR NEW SPECIES

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Since the publication of "A monograph of the helicosporous Fungi Imperfecti,"<sup>1</sup> the writer has had an opportunity to study additional material of this interesting and beautiful group of Fungi Imperfecti. The material was communicated by Professor G. W. Martin of the University of Iowa and by Mr. John Dearness of Toronto, Canada, and to them the writer wishes to express his sincere thanks. In addition to the material mentioned above, the writer, while examining his collection of Fungi Imperfecti, discovered four additional species: two from the tropics, one from Missouri, and one from Alabama. These are to be described later in this paper.

In addition to the description of the four species, these notes are intended primarily to amplify observations on species which have hitherto been collected only once or twice, and secondarily for the purpose of adding localities and thus enlarging the range of the species as given in the previous paper.<sup>1</sup>

*Helicosporium griseum* (Bon.) Sacc. This species is reported from North America for the first time and is represented by two collections. The material from Iowa (*T. A. MacBride*, Iowa City, 1909 (Ia.)<sup>2</sup>) agrees very well with the European material. The spore filaments, however, are somewhat thicker (1.4  $\mu$ ). The Canadian specimen (*Thos. Langton*, Toronto (Ia.)) is almost identical with the Iowan material. It differs only in producing conidia more abundantly and higher on the conidiophores, the latter a character more in agreement with the species as it is delineated by Bonorden<sup>3</sup> in the original figure. The variations between the two collections are very slight and could probably be explained by differences in the environmental conditions.

*Helicosporium phragmites* v. Höhnelt. Although no data were given on the label of this specimen, it appears probable that it was

<sup>1</sup> Linder, D. H. *Mo. Bot. Gard. Ann.* 16: 227-388. *pl. 12-31, 17 text figs.* 1929.

<sup>2</sup> The specimens from Professor Martin, deposited in the herbarium of the University of Iowa, are indicated by (Ia) and those from Mr. Dearness by (D).

<sup>3</sup> Bonorden, H. F. *Handbuch*, p. 74. *fig. 77.* 1851.



collected by MacBride in Iowa (Ia). As is true with the other American collection from Kittery Point, Maine, no perithecial stage was found with the imperfect stage, although it is in close agreement with the European material. The material at hand, as well as that from Kittery Point, strongly suggests an attenuated form of *H. lumbricoides*, but the colonies are not so dense nor are they so readily separable from the substratum. It is interesting to note that this species appears to favor a particular type of substratum,—the Iowan material occurring on old corn stalks, that from Kittery Point on *Carex* stalks, while that from Austria on *Phragmites*.

*Helicomyces bellus* Morgan. The status of this species becomes very doubtful when material, identified by Morgan, is studied. For example, one specimen (Morgan, Ohio, 1902 (Ia)) is clearly *Helicomyces roseus* Lk., while the other (Morgan, Ohio?, 1909 (Ia)) is *Helicosporium lumbricopsis* Linder. This latter material can in no manner be considered to belong under *Helicomyces bellus* since Morgan<sup>1</sup> emphasizes the repent character of the hyphae as follows: "The hyphae creep close to the substratum and are nearly concealed by the abundant spores . . .," and also, "Hyphae creeping, septate, branched, brownish-hyaline, bearing spores on minute lateral teeth." In the material here discussed, the conidiophores are ascending and anastomose after the fashion of *H. lumbricopsis*. Since there is no type material, or at least since it is not available at present, the identity of Morgan's species must remain in doubt.<sup>2</sup>

*Helicoma ambiens* Morgan. When this species was studied during the preparation of the writer's monograph, only a single specimen was available. Recently two additional collections have been studied, one from Iowa (North Liberty, 1905 (Ia)) and another from Canada (Dearness, London, Ontario, 1893 (Ia)), and in both the branching character of the conidiophores and the bluntly rounded, recurved basal end of the conidia proved to be very satisfactory diagnostic characters for the separation of the species from *Helicoma Curtisii*. This latter species is also represented by a collection from Iowa (T. H. MacBride, 1889

<sup>1</sup> Morgan, A. P. Cinci. Soc. Nat. Hist. Jour. 15: 42. fig. 4. 1892.

<sup>2</sup> See NOTE at end of this paper.



(Ia) ). The material is at a very advanced stage of development in which the conidiophores have become loosely aggregated to form loose fascicles, within which there are occasional anastomoses between the elements. There is not, however, any evidence of the branching that is so typical of *H. ambiens*.

From Canada an additional station is reported for *Helicoma olivaceum* (Karst.) Linder (*G. K. Bisby*, Winnipeg, May 26 (D) ), and for *Helicoon ellipticum* (Pk.) Morgan (*Johnson & Bisby*, Winnipeg, Oct. 25, 1927 (D) ). The material is typical of the species represented.

*Helicoma repens* Morgan. This material, collected and named by Morgan, was recently made available for study for the first time. Since it does not agree entirely with the original description<sup>1</sup> it seems desirable to repeat it and to indicate changes by *italics*.

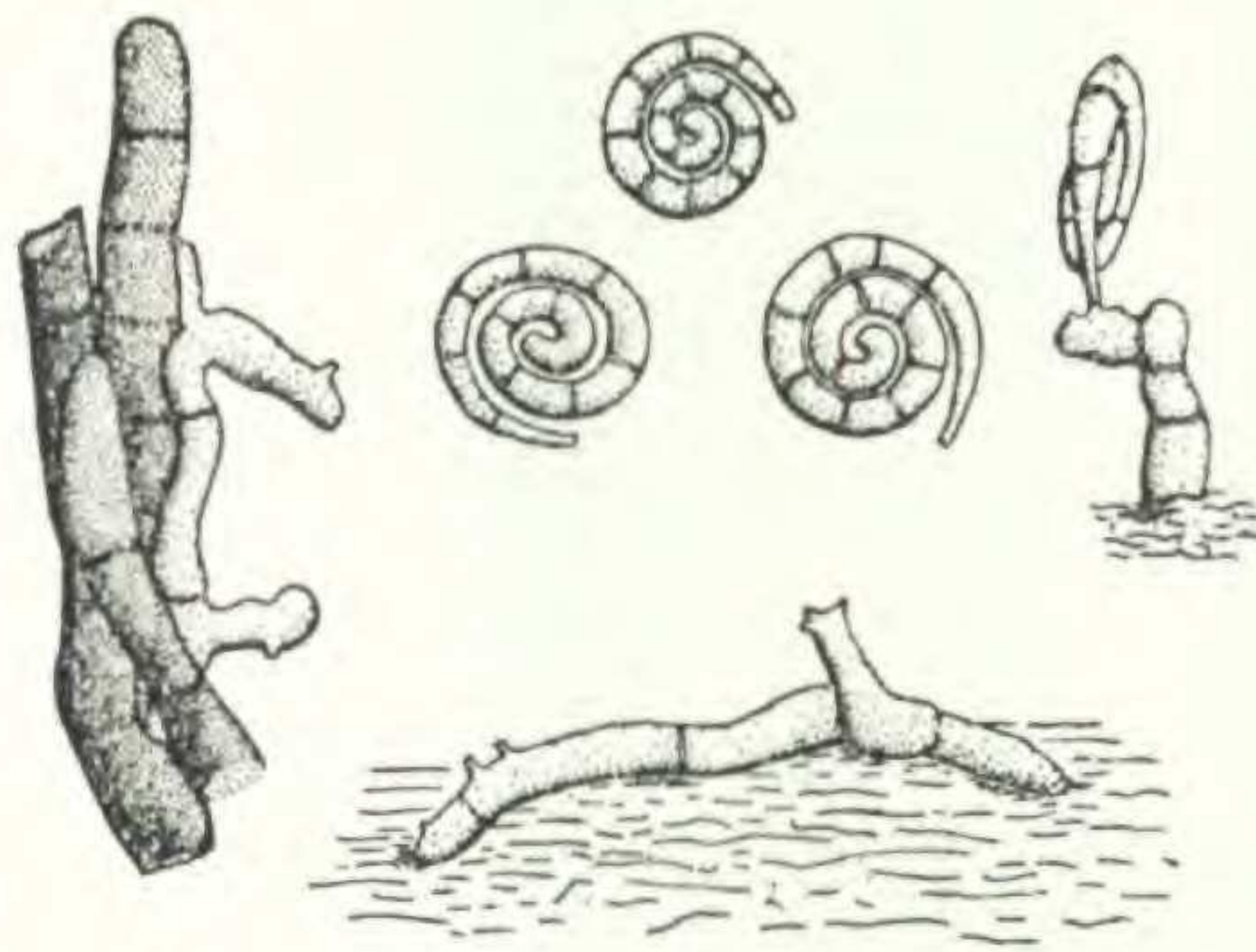


Fig. 1. *Helicoma repens*.  $\times 500$ .

“Effused, forming a minutely flocculose, pinkish stratum. Hyphae creeping, or scandent on hyphae of other fungi, septate, hyaline, with very short ascending branches, which are covered by the abundant spores. Spores hyaline, multiguttulate, 10–16-times septate, coiled nearly  $2\frac{1}{2}$  times; the coil 18–21 (12–15) mic. in diameter; the thread 80–100 mic. in length, about 4 (2–3) mic. thick; the inner extremity obtuse, the outer (*basal*) long and tapering.”

This species closely resembles *Helicoma polysporum*, but is easily separated from it by the more frequently septate spores and the thinner spore filaments. The conidiophores of the two species are much alike. In *H. repens* the conidiophores not only are creeping but, as shown in the accompanying text-figure, are

<sup>1</sup> Morgan, A. P., *l. c.* p. 47. *fig. 12*.



also scandent on the hyphae of other fungi,—in this case on *Helicoma ambiens*.

The specimen studied (*Morgan*, Ohio?, 1887) has been designated as the type, and is deposited in the mycological herbarium of the University of Iowa at Iowa City.

The two following species from the American tropics, one from Missouri, and one from Alabama are described for the first time.

*Helicoma Westoni* Linder, sp. n.

Plate 2, figs. 1–3.

Mycelia sterilia in substratu immersa; conidiophoris fuscis vel ad apices albido-fuscis, simplicibus, rectis vel curvis, subinde geniculatis, 171–216–(252)  $\mu$  longis, in basis 7.2–9  $\mu$  crassis, in apicibus 5.4–7.2  $\mu$  crassis; conidiis acrogenis, subinde pleurogenis, sessilibus, albido-fuscis, in  $1\frac{1}{2}$ – $1\frac{3}{4}$  spiras convolutis, 11–14-septatis, septis hyalinis; filis conidiorum laeviter fastigatis, basis truncatis, apicibus rotundatis, 11.5–13.5  $\mu$  crassis; spiris 33.5–38  $\mu$  diam.

Colonies inconspicuous, of scattered conidiophores. Sterile mycelium imbedded in the substratum. Conidiophores fuscous below, dilute or light fuscous at terminal cells, simple, erect or ascending, occasionally geniculate where first spores were produced, 171–216–(252)  $\mu$  long, 7.2–9  $\mu$  thick at base, 5.4–7.2  $\mu$  above. Conidia acrogenous, less frequently tardily dehiscent and then pleurogenous, sessile, dilute fuscous,  $1\frac{1}{2}$ – $1\frac{3}{4}$ -times tightly coiled, 11–14-times septate, septa hyaline, filament tapering slightly towards the ends, the basal end truncate, the distal end abruptly rounded, 11.5–13.5  $\mu$  thick, the coiled conidia 33.5–38  $\mu$  diam.

On decaying sheath of cocoanut palm. Trinidad, B. W. I.

This species is dedicated with great pleasure to Professor William H. Weston, Jr., of Harvard University, as a token of gratitude for the inspiring instruction and the kindly and generous assistance given to the writer while a student.

No species is comparable to this one, since all others with conidia similar to those of *H. Westoni* produce their spores on distinct sporogenous teeth. In this species, the conidia not only



are sessile, but are also provided with a distinct hyaline upward-tapering collar at the base of the spore filament.

Specimen examined:

Trinidad, B. W. I.: St. Augustine, *Linder, 15*. TYPE (in Farlow Herbarium of Harvard University).

*Helicoma anastomosans* Linder, sp. n.

Plate 2, figs. 4-9.

Coloniae effusae, flocculosae, dilute-roseae; conidiophoris albedo-fuscis, pellucidis, simplicibus, rectis vel curvis, parce ramosis vel anastomosis, (20)-30-60-(100)  $\times$  3.6-5.5-(6.5)  $\mu$ ; conidiis acrogenis, raro pleurogenis, ad dentes gracilis conspicuos, hyalinis, 18-25-septatis, septis hyalinis, filis in  $1\frac{1}{2}$ - $1\frac{3}{4}$  spiras convolutis, 3.5-4  $\mu$  crassis; spiris 19.8-23.4  $\mu$  diam.

Colonies effuse, flocculose, pinkish. Conidiophores dilute fuscous, pellucid, simple, erect or ascending, sparsely branched, anastomosing, (20)-30-60-(100)  $\times$  3.6-5.5-(6.5)  $\mu$ . Conidia acrogenous, less frequently pleurogenous, obliquely attached to conspicuous slender cylindrical sporogenous teeth, hyaline, 18-25-times septate, the septa hyaline; filament  $1\frac{1}{2}$ - $1\frac{3}{4}$  times coiled, 3.5-4  $\mu$  thick, the coiled conidia 19.8-23.4  $\mu$  diam.

On decaying manicole palm. British Guiana.

Although resembling *H. Morgani* in its spore characters, this species is quite distinct. The conidiophores, instead of being rather elongate and loosely branching, are short and simple, and anastomose frequently. The sporogenous teeth are prominent and cylindrical. Such characters, although seemingly of minor importance, are remarkably constant and separate this species quite clearly. Still another character is the method in which the conidia are produced. In *H. Morgani*, although two spores may be borne on or near the end of a conidiophore at the same time, they are not as a rule of equal age and hence when both conidia are mature, one, the older, is somewhat lower on the conidiophore than the other. In this species, two or occasionally more conidia are produced almost simultaneously, so that the spores appear frequently in pairs at an equal height on the conidiophore, generally at the apex.



Specimen examined:

British Guiana: Plantation Vryheid, *Linder*, 836. TYPE (in Farlow Herbarium of Harvard University).

*Helicoma tenuifilum* Linder, sp. n.

Plate 2, figs. 10-13.

Coloniae effusae, "Dark Olive" vel "Chaetura Drab";<sup>1</sup> conidiophoris fuscis vel albido-fuscis, ad cellulas extremas hyalinis, rectis vel curvis, ramosis vel multi-ramosis, perraro anastomosis, 25-60-(80)  $\times$  3.6-5  $\mu$ ; conidiis acrogenis, raro pleurogenis, ad dentes gracilis fastigatos, hyalinis, 18-25-septatis, septis hyalinis, filis in  $2\frac{3}{4}$ - $3\frac{1}{4}$  spiras convolutis, 2.5-3.6  $\mu$  crassis; spiris 21-28  $\mu$  diam.

Colonies effuse, velvety, with age becoming matted, "Dark Olive" to "Chaetura Drab." Conidiophores fuscous to light fuscous below, dilute fuscous to hyaline at the terminal cells, erect or ascending, branched to much branched, very rarely anastomosing, 25-60-(80)  $\times$  3.6-5  $\mu$ . Conidia acrogenous, less frequently pleurogenous, obliquely attached to short, tapering, sporogenous teeth, hyaline, 18-25-times septate, the septa hyaline; filament  $2\frac{3}{4}$ - $3\frac{1}{4}$  times coiled, 2.5-3.6  $\mu$  thick, the coiled conidia 21-28  $\mu$  diam.

On decaying bark of *Carya?* Missouri.

With *H. violaceum*, *H. Morgani*, and *H. anastomosans*, *H. tenuifilum* constitutes a rather homogeneous section in the genus *Helicoma*. The four species are characterized by the same type of conidia, and, with the exception of *H. violaceum*, the conidia are attached obliquely to the sporogenous teeth. *H. tenuifilum*, as the name implies, has more slender conidial filaments that are coiled more times. In addition, the conidia are produced singly. The conidiophores also are characteristic in that they are more richly branched, the branches never exceeding the length of the main axis of the conidiophores, as in *H. Morgani*. Occasionally the main axis of the conidiophore elongates (pl. 2, fig. 10) and later becomes much branched on the lower portions, thus resembling a fascicle of conidiophores. Fascicles, however, are not

<sup>1</sup> Ridgway, R. Color standards and nomenclature. Washington, D. C., 1912.



of rare occurrence in the older parts of the colony and give to it its matted appearance. "Sclerotes pedicelées" are present and in some instances suggest perithecia initials.

Specimen examined:

Missouri: Allenton, Oct. 1929, *Linder*, TYPE. (Mo. Bot. Gard. Herb., 68076, and in the writer's herbarium).

*Helicomyces fuscopeus* Linder, sp. n.

Text-fig. 2.

Colonia effusa, stratum tenue, albidum formans; myceliis sterilibus fuscis in substrato immersis vel ad superficiem applicatis; conidiophoris dilute fuscis, rectis, simplicibus vel propter dentes sporigeros conspicuos ad apicem simulate breve ramosis, 1-3-septatis, 18-39-(50)  $\times$  2.5-3.6  $\mu$ ; conidiis hyalinis, acrogenis vel

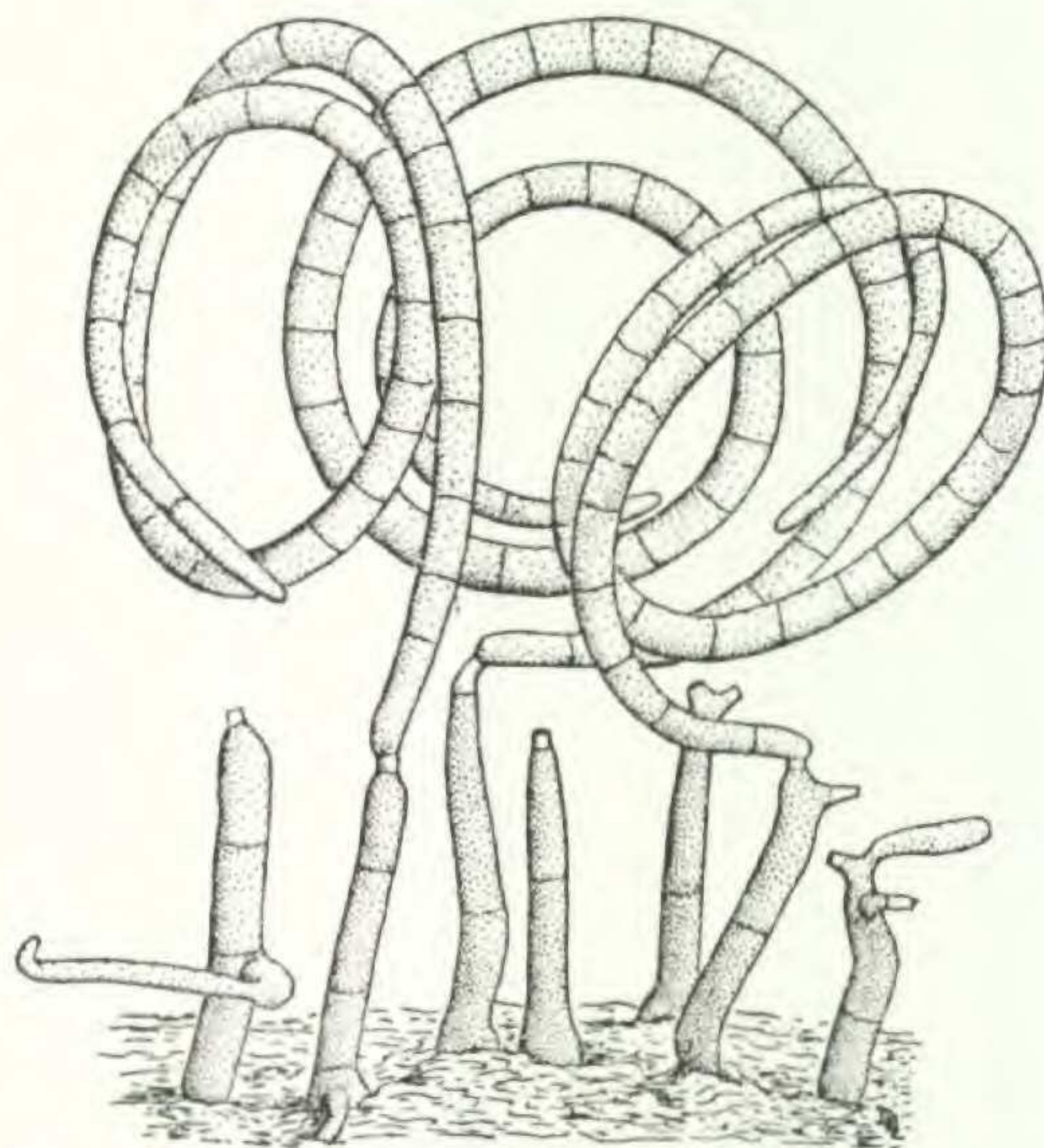


Fig. 2. *Helicomyces fuscopeus*.  $\times$  500.

aliquando pleurogenis, multiseptatis; filis in spiras  $1\frac{1}{4}$ - $2\frac{1}{4}$  convolutis, 3.6-4.5  $\mu$  crassis, ad extrema exteriora fastigatis, ad bases rotundatis et oblique complanatis; spiris 39.5-62  $\mu$  diam.

Colony effused, forming a thin white flocculose layer. Sterile mycelium immersed in the substratum or closely appressed to the surface, fuscous. Conidiophores dilute fuscous, erect or bent, simple or apparently short-branched above because of the conspicuous sporogenous teeth, 1-3-septate, 18-39-(50)  $\times$  2.5-3.6  $\mu$ . Conidia hyaline, acrogenous or occasionally pleurogenous, mul-



tiseptate, the filament  $1\frac{1}{4}$ – $2\frac{1}{4}$  times coiled, 3.6–4.5  $\mu$  thick, tapering toward the acutely rounded distal end, and toward the rounded, obliquely flattened basal end; diameter of coil 39.5–62  $\mu$ .

On moist decaying wood. Alabama.

The conidia of this species are attached obliquely, as are those of *H. roseus*, but from that species it may be distinguished by the erect fuscous and somewhat pellucid conidiophores that arise, for the most part, directly from the substratum, and not from hyaline creeping mycelium. The conidia of this species are also somewhat larger than are those of the related species.

Specimen examined:

United States:

Alabama: Montgomery, Oct. 1917, *R. P. Burke*, 369. TYPE. (Mo. Bot. Gard. Herb. 57236).

NOTE.—While this paper was in press, the writer in examining undetermined material, came across a specimen (Montgomery, Alabama, Aug. 1916, *R. P. Burke*, 327) which proves to agree with Morgan's description of the species, especially as regards the repent, anastomosing, fuscous conidiophores. The spore filaments, however, are 1.5–2  $\mu$  in diameter, and are coiled only  $1\frac{1}{2}$  to  $2\frac{1}{2}$  times. For the present, the specimen has been labelled *Helicomyces bellus* Morg.

## EXPLANATION OF PLATE

### PLATE 2

All drawings are made with the aid of a camera lucida. As reproduced they represent a magnification of  $\times 500$ .

Figs. 1–3. *Helicoma Westoni* n. sp.

Spores and conidiophores. The characteristic hyaline collars may be discerned at the base of the conidia.

Figs. 4–9. *Helicoma anastomosans* n. sp.

The anastomosing of the conidiophores, typical of the species, is shown in fig. 4, and to a lesser extent in fig. 5. The sporogenous teeth are more prominent in this than in the following species.

Figs. 10–13. *Helicoma tenuifilum* n. sp.

In fig. 10 may be seen an elongated conidiophore that is just beginning to branch below. The sporogenous teeth are short and tapering.